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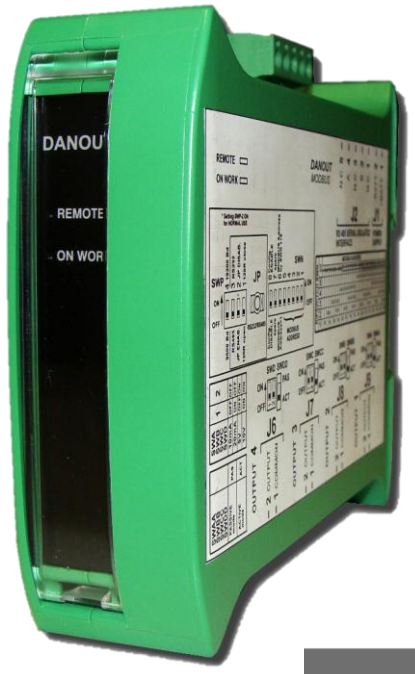

User's Manual

DANOUT (4 analog outputs module with RTU/CanBus Modbus protocol)

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1. GENERAL CHARACTERISTICS

The **DANOUT** (Digital Analogic Outputs) device generates voltage or current signals on four different channels, galvanically insulated either from each other and from power lines. Each channel can be independently configured, so to supply **0..5 V** or **0..10 V** voltage outputs or **0..10** or **0..20 mA** current loops in active or passive mode.
The device is available in two versions, with **CANBUS** or **RS485 MODBUS RTU** communication; both versions feature galvanically insulated communication lines. An additional (non insulated) RS232 Jack connection is available for device configuration.
The outputs modulation is generally performed through a CANBUS (EX-BUS) connection with a dedicated protocol for a Sices **DST4602** board. After setting the proper configuration parameters, the SICES board can manage up to 8 modules (32 outputs).
The RS485 serial version is used for special applications, for sending direct commands from MODBUS RTU devices operating as masters, for working on the **DANOUT** device modbus registers.
The device can be installed on a DIN guide.

1.1 VERSIONS AVAILABLE

E6102094200xx	**DANOUT CANBUS** (insulated CAN BUS + non-insulated RS232 via jack connector). Designed to be used with DST4602 devices with CANBUS connection; up to 8 modules with SICES EX-BUS proprietary protocol can be connected
E6102094201xx	**DANOUT MODBUS RS485** (Insulated RS485 + non-insulated RS232 with jack connector used only for configuration). For use with devices using MODBUS RTU protocol with RS485 connection: 32 possible addresses.

2. TECHNICAL SPECIFICATION

Power voltage	7÷32VDC
Current absorbed	Typ. 280 mA (@ 13V) Max 380 mA (@ 13V)
Power consumption	Typ. 3.7 W Max. 4.9 W
Isolation of input reading channels	1000 V
Voltage outputs	monopolar; two scales: 0.. 5V - 0..10V minimum load impedance 20 kOhm
Current outputs	monopolar; two scales: 0..10mA - 0..20mA maximum load impedance 500 kOhm

Readings	
Precision (with reference to f.s.)	0.05%
Linearity	0.05%
Thermal drift (with reference to f.s.)	0.01%/K
Update time (CAN signal)	200 ms
Digital conversion resolution	14 bit
Reading resolution	1/256
Command resolution (on DST4601/PX)	1/10 (0.1%)
Reading dynamics received	0 to 100 % with 8 decimal bits (1/256ths).

Environmental conditions	
Operating temperature :	from -20°C to +60°C
Humidity:	from 30 to 90% condensate-free
Storage temperature:	from -20°C to +70°C
Degree of protection	IP 20

Dimensions/Weight			
Dimensions:	101Hx35Lx119D	**Weight:**	165 g

Connections
J1 VDC power supply
J6, **J7**, **J8, J9** analog signal outputs
JP 3.5 mm RS232 jack for parameter configuration.
J2 RS485 or CANBUS connection with galvanic insulation.

2.1 INDICATORS

LED	Description
ON WORK	Running LED (flashes to indicate the device is on)
REMOTE	Indicates the state of the main communication interface. CANBUS version: blinking LED = no communication (bus Off or passive error), LED On = active CAN communication (Active error). RS485 version: LED Off = no communication, LED on = communication active.

3. MODBUS SPECIFICATIONS

Protocol : **Rtu Modbus**

Two switch selectable baud rates : **9600 / 19200**

Transmission parameters: **N, 8, 1** fixed

Modbus address selectable via SWN switch: **1-32** (RS485 version), **1-16** (CANBUS version)

Please note : register writing is switch-protected (SWN-8=OFF → active protection, write not possible).

Modbus Registers - Input Register		Format
30001	Analog output 1 point value	14 bit (ranging from 0 to 16383)
30002	Analog output 2 point value	
30003	Analog output 3 point value	
30004	Analog output 4 point value	
30011	SWN switch on start-up and current	8 high bits = power on start-up, 8 low bits = current switch position. 0=OFF, 1=ON
30019	Test Flag	0 = normal operation, 1 = testing board
30201	Presence of CANBUS interface	1 = interface present, 0 = not present
30202	CANBUS state	0 = Error Active, 1 = Error Passive, 2 = BusOff

Modbus Registers - Holding Register		Format
40001	Analog output 1 point value	14 bit (ranging from 0 to 16383)
40002	Analog output 2 point value	
40003	Analog output 3 point value	
40004	Analog output 4 point value	
40011	Analog output 1 percentage value	16 bit : high 8 bits = entire part (0 to 100%) low 8 bits = decimal part (in 256ths: 0.5 = 127)
40012	Analog output 2 percentage value	
40013	Analog output 3 percentage value	
40014	Analog output 4 percentage value	
40101	Analog output type 1	0= 0-10 mA 1= 0-20 mA 2= 0-5 V 3= 0-10 V
40102	Analog output type 2	
40103	Analog output type 3	
40104	Analog output type 4	

4. CanBus specifications (EX-BUS proprietary SICES protocol)

CAN speed: **250 kbit/s**
CAN settings: **sample point at 75%, 11bit identifier (standard format)**

Messages transmitted EX-BUS:

ID	MIX	L. data	Description
0x520 – 0x52F	MXD-DANOUT	8 byte	Data: contain the 4 analog outputs percentage values. 16 bit for each reading. Typical transmission frequency : 200 msec Ex-Bus size: high 8 bits = entire percentage value from 0 to 100. low 8 bits = decimal value in 256ths. E.g.: 0x1466 = 20.4%
0x420 – 0x42F	MXS-DANOUT	6 byte	**Diagnostics**. It contains: board type, firmware revision, CAN error counters. Transmission frequency: 1 sec.

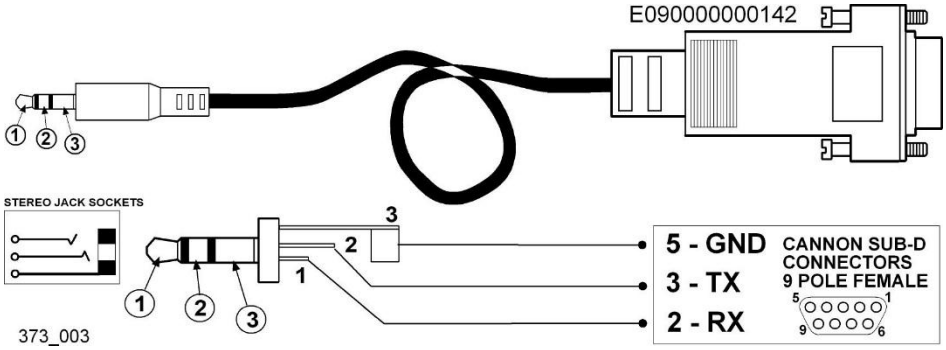
Note: each module transmits with an ID. The ID selection is made with SWN switches 1-4 (EX-BUS ADDRESS). To change the EX-BUS address, after modification via switch, turn the DANOUT module Off, then On again.
For further information on EX-BUS protocol, refer to EAAS0346xxxx specifications.

5. Configuration

The configuration requires a RS232 serial connection to a PC via the **JP** Jack connector or a serial RS485 connection via the **J2** (only for **DANOUT MODBUS RS485 versions)** and the BoardPrg program (version 2.25 and following).

BoardPrg can be downloaded from www.sices.eu/download (you must register before accessing the site reserved area)

⚠ ***Notes: Use of the E090000000142 cable is required for serial RS232 (JP Jack connector) connection (RS232-E20931 module connection cable).***



- Set the serial port to be used on the PC (**Communication** Menu, → **Select Communication Resource**). Check the communication parameters: **9600, N, 8, 1**
- Set the **Modbus** address (**Communications** Menu → **Serial address** : default = 1)
- Display parameters value (**File** Menu→ **Parameters management**)
- Connect to the **DANOUT** board (**Connect**).

⚠ ***Important: Read the parameters (Read command), and transfer the values to the New Value column, where you can edit them (Copy command).***

Now you can configure the device.
After completing the configuration: check that the dipswitch is **SWE 8=ON** and press **Transmit**.
You may now save the configuration on a **PC** (Save), and reload it (Load) at a later time to configure other modules in the same way.

⚠ ***After programming, switch SWE dipswitch 8 OFF again to activate write protection.***

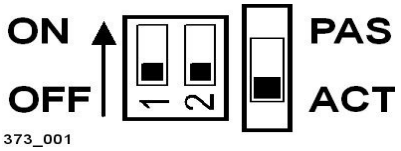
5.1 Select output type and end-of-scale

Switches SWA, SWB, SWC and SWD set the output type for each channel; the switches SWAA, SWBB, SWCC, SWDD set active or passive mode:

SWA, B, C, D

Output type	SWx1	SWx2
0..10 mA	OFF	OFF
0..20 mA	ON	OFF
0..5 V	OFF	ON
0..10 V	ON	ON

SWAA, BB, CC, DD



Mode	SWxx
PASSIVE	PAS
ACTIVE	ACT

Important: Ensure to set switches only with module power Off.

In passive mode the output current loop requires external power.
In active mode the output current loop is directly powered by the DANOUT module.
In case the selected output is of voltage type (0..5V o 0..10V), ensure that the mode switch is set to 'ACTIVE'.
After setting the switches, ensure to adjust the parameters set in the DANOUT module.
The default output type is set to 0, corresponding to the 0..10 mA output.
Selecting the output type from parameter is required for a correct device operation (it allows using calibration data pertaining to the selected output type).
Select in the drop down menu under "Output type" of the BoardPrg program.

5.2 Switch settings

5.2.1 SWN Switch for MODBUS RS485 Version

SWN SWITCHES	Description
1- 5	Assign modbus device address (from 1 to 32) with SW6 = ON
6	Modbus address block. ON = from switches 1-5, OFF=1 fixed
7	Not used
8	ON = enable parameter writing

Modbus address allocation table

		MODBUS ADDRESS																													
SWN DIPSWITCHES	ON	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
	5																	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	4									x	x	x	x	x	x	x	x									x	x	x	x	x	x	x	X
	3					x	x	x	x					x	x	x	x					x	x	x	x					x	x	x	X
	2			x	x			x	x			x	x			x	x			x	x			x	x			x	x			x	X
	1		x		x		x		x		x		x		x		x		x		x		x		x		x		x		x	X

5.2.2 SWN switches for CanBus Version

SWN SWITCHES	Description	
1	*EX-BUS*	*Jack JP Modbus*
2	ID EX-BUS (tx from 0x520 to 0x52F; rx from 0x420 to 0x42F)	Modbus device address assigned from 1 to 16 (if SWN 6=ON)
3		
4		
5	Not used	
6	Modbus address block. ON = selected with switches 1-4, OFF = 1 fixed	
7	Not used	
8	ON = enable parameter writing	

EX-BUS address assignment table

	EX-BUS ADDRESS																
SWN DIPSWITCHES	ON	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	4									x	x	x	x	x	x	x	x
	3					x	x	x	x					x	x	x	x
	2			x	x			x	x			x	x			x	x
	1		x		x		x		x		x		x		x		x

5.2.3 JP serial configuration switch

SWP SWITCH	ON	OFF
1	Enables the RS485 120 Ω line termination resistor	Disables the RS485 120 Ω line termination resistor
2	Disable RS232/RS485 serial JP	Enable RS232/RS485 serial JP
3	Configures JP as serial RS232	Configures JP as serial RS485
4	baud rate = 19,200	baud rate = 9,600

6. INSTALLATION INSTRUCTIONS

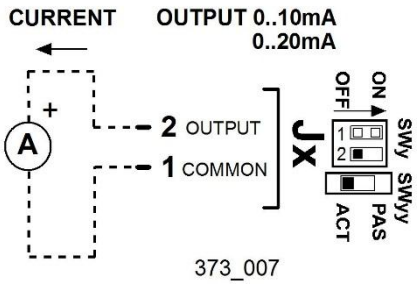
The device is designed to be mounted on a DIN 46277 guide in upright position. It requires adequate ventilation to function properly. Avoid installing above and/or near devices that produce heat.

For analog outputs connection ensure to use twisted cables only; in case you use a shielded cable, ensure to connect the shielding to a ground close to the input connectors.
For an RS485 connection, use a shielded cable with a 120 ohm impedance; for CANBUS connection, use the appropriate cable, e.g. KELUKABEL 800571.
RS485/CANBUS terminations: to minimize reflections, the first and last device in the RS485 or CANBUS network must have a termination resistor connected in parallel with the **120 ohm ½ W** line.

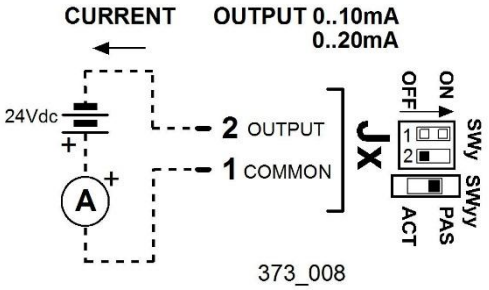
7. Output connections

7.1 Current output

Active operation:

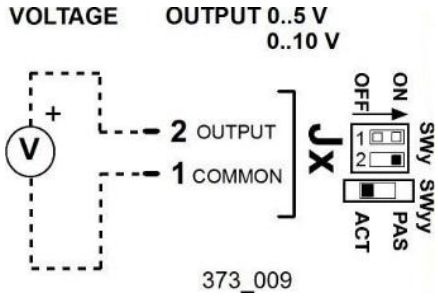


Passive operation:

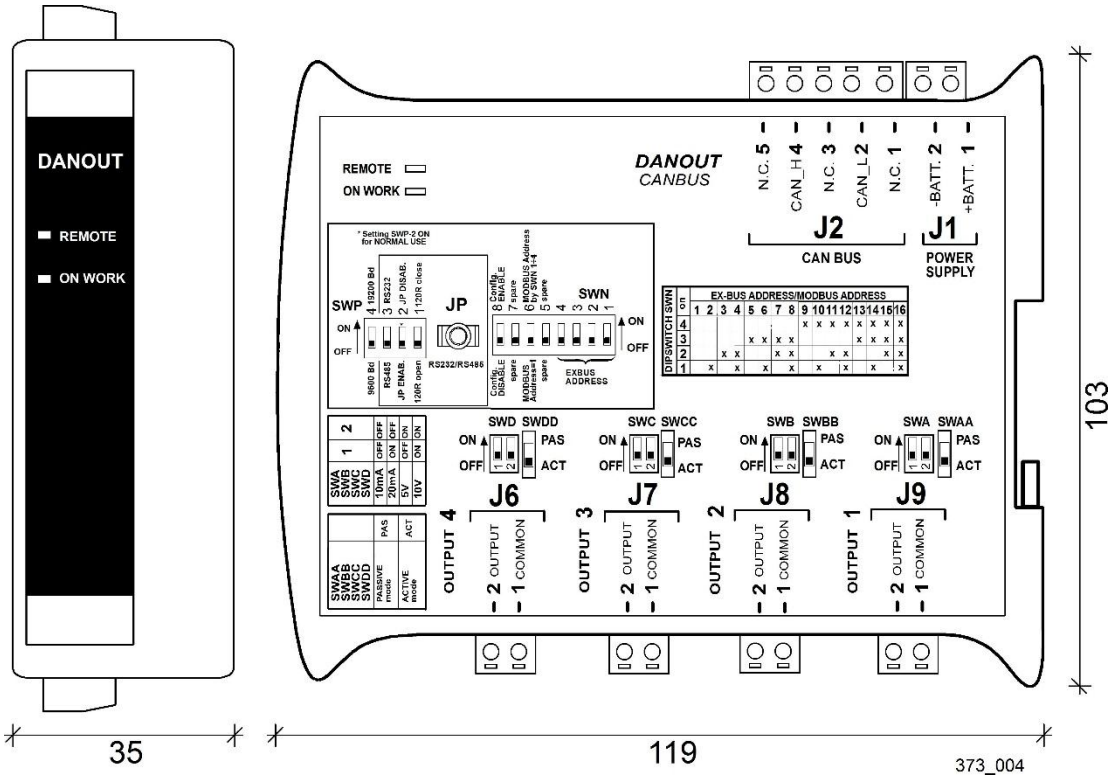


7.1.1 Voltage output

Active operation:

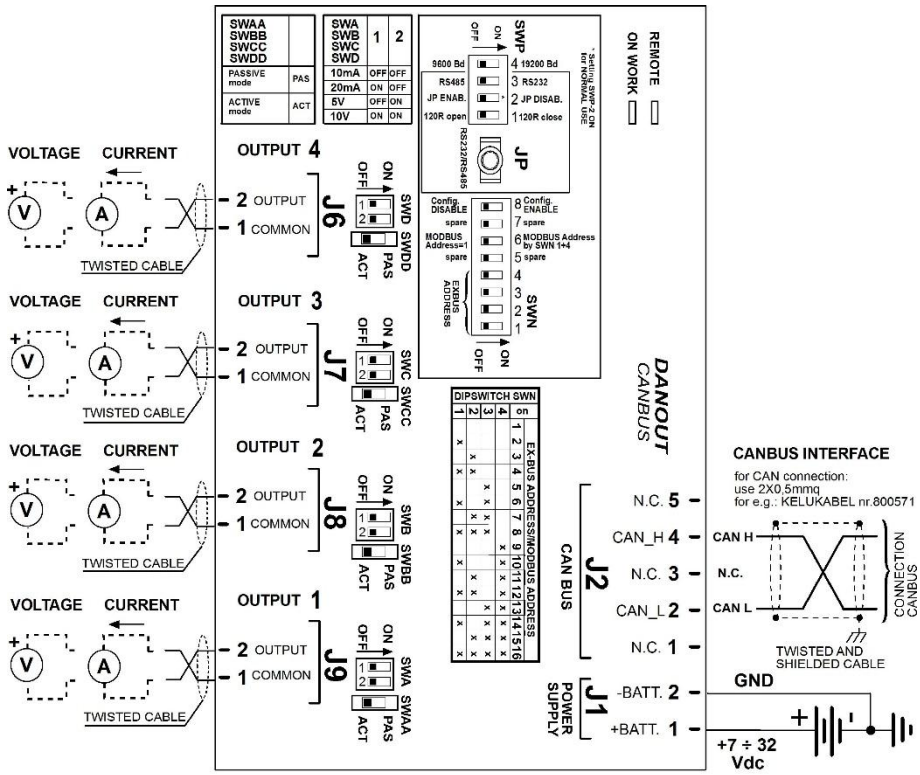


8. Dimensions



9. Summary of connections

9.1 CAN BUS version



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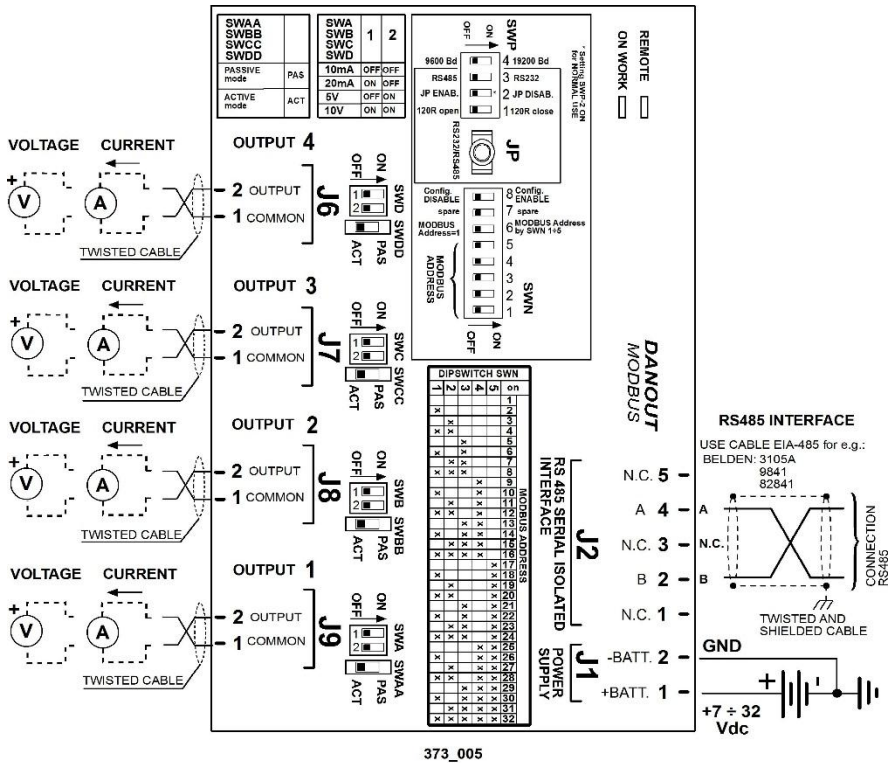
9.2 RS485 version



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